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AUTHOR Sorg, Steven E.; Darling, Carol J.
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ABSTRACT

To meet the challenges of a rapidly-growing student population, a desire to increase student retention and success rates, a shortage of classroom space, and the need to maintain quality educational opportunities for students, the University of Central Florida (UCF) is strategically employing distributed learning. In three years, UCF has progressed from no coordinated distributed learning program to a highly-developed award-winning program consisting primarily of fully and partially World Wide Web-based courses. Characteristics of UCF's Web-based courses include: instructor-led, highly interactive courses; learner-centered, active learning; pedagogically sound instructional design; clear learning objectives and outcomes; and opportunity to build computer literacy. The significant issues that have lead to UCF's planning and implementation of a successful distributed learning initiative are institutional strategic planning, organizational structure, technical infrastructure, faculty development for teaching online, leaner support, support for units, research and development activities, and impact evaluation. Research and development activities that provide data and support the UCF's distributed learning initiative include course development and Web service development (e.g., software engineering and Web production, instructional design, and administrative support) and distributed learning impact evaluation research. (MES)

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Institutionalizing Distributed Learning:

Models of Practice

Presenters:

Steven E. Sorg, Ph.D.

Assistant Vice President for Distributed Learning

and

Carol J. Darling, Ph.D.

Coordinator of Distributed Learning

Contributing Authors:

Chuck Dziuban, Joel Hartman, Frank Juge, Barbara Truman-Davis

University of Central Florida

Center for Distributed Learning

12424 Research Parkway, Suite #264

Orlando, Florida 32826-3271

Phone 407/207-4919

FAX 407/207-4911

email: sorg@mail.ucf.edu and cdarling@mail.ucf.edu

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Abstract

To meet the challenges of a rapidly-growing student population, a desire to increase student retention and success rates, a shortage of classroom space, and the need to maintain quality educational opportunities for students, the University of Central Florida is strategically employing distributed learning. In three years, UCF has progressed from no coordinated distributed learning program to a highly-developed award-winning program consisting primarily of fully and partially Web-based courses. The significant issues that have led to the University's planning and implementation of a successful distributed learning initiative are institutional strategic planning, organizational structure,

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technical infrastructure, faculty development for teaching on-line, learner support, support for units, research and development activities, and impact evaluation.

Description of UCF's Distributed Learning Initiative

The University of Central Florida: Overview and Context

The University of Central Florida, a member institution of the State University System of Florida, is a major metropolitan University whose mission is to deliver a comprehensive program of teaching, research, and service. The University offers degree programs at all levels of instruction with an enrollment of 32,000 students. Predictions indicate that by 2010 the University will enroll 50,000 students. Enrollment consists of many nontraditional, adult, and part-time students. The average age of students is 25-26 years old. Only 2,000 students are housed on campus. UCF is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools to award degrees at the associate, baccalaureate, master's, and doctoral levels.

The campus culture can be described as follows:

- appreciation of a balance of teaching and research missions
- responsiveness to change
- acceptance and expectation of collegiality
- acceptance of allocation of resources to increase/maintain program quality
- acceptance of allocation of resources to increase visibility for the institution.

Challenges facing the University

The University is facing challenges associated with dynamic institutional growth, a shortage of classroom space, and the commitment to maintain quality educational opportunities for students. In addition, changing student demographics, an increasing need for accessible lifelong learning, and advances in information technologies are realities that face the institution.

To meet these challenges and to support the University's goals, mission, and Strategic Plan, UCF is strategically employing distance and distributed learning. The various modalities employed were chosen to enhance student learning and success, to increase access, to improve classroom space utilization especially of large classrooms, to develop student and faculty information literacy, and to enhance student convenience and satisfaction. The University has chosen to employ the World Wide Web as its primary tool for distributed learning.

Credit courses are defined according to the following delivery methods:

Enhanced with media/electronic mail (E): Courses are enhanced with the WWW or other electronic media-based materials. These courses do not reduce seat time with electronic instruction.

Reduced seat time/mixed-mode (M): Courses require electronic media-based instruction that substitutes for some classroom time (reduced seat time). These courses have regular live meeting times.

Students must have access to the Internet, a Web browser such as Netscape, basic Web browsing knowledge, ability to use e-mail, and basic computer skills such as word processing.

World Wide Web (W): Courses are delivered fully over the Internet. Students must have access to the Internet, a Web browser such as Netscape, basic Web browsing knowledge, ability to use e-mail, and basic computer skills such as word processing.

UCF Models of Web-based Instruction

Faculty receive assistance in building W and M courses that are pedagogically sound and visually appealing. Characteristics of UCF's Web-based courses include:

- instructor-led, highly interactive course
- learner-centered; active learning
- pedagogically sound instructional design
- clear learning objectives and outcomes
- opportunity to build computer literacy.

Since 1997, UCF faculty have developed over 200 on-line courses. During the Fall 1999 semester, 8,191 students were enrolled in 385 distributed learning credit course sections. In that semester, 55 fully Web-based (W) course sections enrolled 1,943 students, 78 partially Web-based (M) course sections enrolled 5,092 students, 68 interactive TV (T) course sections enrolled 697 students, 181 FEEDS (F) course sections enrolled 364 students, and 3 Radio (R) course sections enrolled 95 students. In addition, more than 9,700 students were enrolled in 120 courses that use the Web for enhancement.

Current and Anticipated UCF Web-based Degree Programs

The current Web-based degree programs are:

B.S./B.A. in Liberal Studies (Web-based degree completion program)
B.S. in Vocational Education and Industry Training (Web-based degree completion program)
R.N. to B.S.N. Nursing (Web-based degree completion program)
M.A. and M.S. in Vocational Education (Web-based)
M.S. in Industrial Chemistry Forensic Science Option (partially Web-based)
Curriculum and Instruction Ed.D. Program Community College Focus (partially Web-based)

M.A. in Educational Media (Web-based).

The following degree/certificate programs are under development for future full Web-based delivery:

A.S. to B.S. in Radiologic Science
M.S. in Nursing
Graduate Certificate in Technical Writing.

Recognition of UCF's Distributed Learning Initiative

UCF has received the following recognitions for its Distributed Learning Initiative:

Excellence in Distance Learning Programming/Higher Education award presented by the United States Distance Learning Association, for excellence in designing and delivering an outstanding and comprehensive distance learning program service, March 2, 2000, Washington, DC, at TeleCon East 2000, the world's leading conference for on-line/distance learning technology and applications.

UCF was awarded a $200,000 grant in 1999 by the Pew Learning and Technology Program at the Center for Academic Transformation as part of the Pew Grant Program in Course Redesign for redesigning a high enrollment introductory general education course, POS 2041 American National Government.

APQC-SHEEO (American Productivity and Quality Center--State Higher Education Executive Officers) faculty development award for using technology in teaching as one of five "best practice" institutions in North America, presented in November, 1998.

UCF was recognized in both 1998 and 1999 as among the nation's 100 Most Wired Campuses by Yahoo Internet Life magazine.

Davis Productivity Awards are presented annually to honor individuals and work units of Florida state government for innovation, creativity, and smart work that measurably increase performance and productivity in the delivery of state services and products.

A Davis Productivity Award was awarded to UCF in 1998 for POLARIS for the improvements in service and decreased operating costs that it afforded. POLARIS is a Web interface to many administrative services for students, faculty, and staff.

A Davis Productivity Award was awarded to UCF in 1999 for efforts to restructure telecommunications services to improve performance and reduce costs.

Models of Practice

Eight institution-wide components contribute to UCF's success in distributed learning:

- institutional strategic planning
- organizational structure
- technical infrastructure
- faculty development
- learner support
- support for units
- research and development
- impact evaluation.

The first three are core readiness characteristics that must be present to employ distributed learning on an institutional level. The next two require full institutional support for the distributed learning program to be successful. And the final three account for distributed learning growth and continued improvement.

Institutional Strategic Planning

The innovative use of information technology is integrated into UCF's Strategic Plan and senior administrators have identified IT as a means of achieving the institution's goals. The University's early history provides the background for its continuing focus on technology. UCF was established in 1963 as Florida Technological University primarily in response to the need for scientists and engineers at the Cape Kennedy space complex. In 1994 the University Strategic Planning Council was charged with revisiting the 1991 Strategic Plan with the subsequent revision completed in 1996. The present plan has, as its central support, the original five goals identified by President John C. Hitt and adopted in the 1991 Strategic Plan. The five goals are to:

- offer the best undergraduate education available in Florida
- achieve international prominence in key programs of graduate study and research
- provide international focus to our curriculum and research programs
- become more inclusive and diverse
- be America's partnership University.

In order to accomplish the five goals, the Strategic Plan delineated four strategic directions, one of which is the innovative use of technology. The Strategic Plan recommends the maintenance of an advanced institutional technology infrastructure that supports the institution's primary functions of teaching, research, and service, and the provision of adequate technology for all faculty, staff, and administrators. The plan encourages the proactive development and deployment of instructional technologies and distance learning delivery modes to facilitate time- and place-independent learning or just-in-time learning.

Organizational Structure

The structure of the University administration has been organized to support distributed learning program development and the use of technology to enhance operational excellence. The Division of Information Technologies and Resources, formed in 1995, brings together the Library, Computer Services (academic and administrative computing), Telecommunications, and Instructional Resources into a single administrative unit. The position of Vice Provost for Information Technologies and Resources was created to head this division, which reports to the Provost and Vice President for Academic Affairs. During 1996 the Course Development & Web Services unit was formed to create on-line courses and provide related faculty development support. In 1997, the Vice Provost for Academic Affairs reorganized his division to create the Center for Distributed Learning.

Organizational Structure

Information Technology Infrastructure

Computing is fully integrated into the UCF campus culture. The University is committed to the maintenance of an advanced institutional technology infrastructure that supports the institution's primary functions of teaching, research, and service, and the provision of adequate technology for all employees and students. The Information Technologies and Resources Division facilitates a comprehensive and coordinated response to the University's information technology needs.

Networking: Networking has become a core strategy as well as a resource for the University as it strives to serve a growing student population over an expanding geographic area and extends into new areas of research. Although UCF was recognized in both 1998 and 1999 as among the nation's 100 Most Wired Campuses by Yahoo Internet Life magazine, our goal is to be more than simply a "wired campus". UCF is using network technology to create a sense of community, extending "7 by 24" access to information, services, and people to all students and employees.

Stated simply, our objective is to create a high performance and ubiquitous network, fill it with useful information and services, and make it accessible to all UCF students, faculty, and staff. In response to the institution's rapid growth and distributed student population, UCF is harnessing its network and the Web to provide expanded access to institutional information and services.

A series of core network services has been established consisting of electronic mail, the World Wide Web, the full suite of Internet utilities (e.g., telnet, ftp, etc.), a wide array of on-line library information, image processing, and on-line course delivery. Access to UCF information and services is available through the University's main website www.ucf.edu) and services such as POLARIS, a Web interface to many administrative services for

students, faculty, and staff. POLARIS was awarded a Davis Productivity Award by the State of Florida in 1998 for the improvements in service and decreased operating costs that it afforded. These services are available to all UCF network users. All central servers have been continuously upgraded, and new servers have been added to accommodate the growth in both users and on-line information. The number of main network servers has doubled over the past two years.

UCF is a charter member of Internet2, and has played a leadership role in the advancement of education and research networking in Florida. UCF is one of only approximately 160 institutions with high performance connections.

Another distinguishing feature of UCF is the degree to which information technology is integrated into the institution's Strategic Plan (the current plan makes more than 60 specific references to IT), and the degree to which senior University administrators have identified information technology as a means of achieving the institution's goals.

Infrastructure: In 1996, UCF completed a campus connectivity project, through which all faculty and staff offices not previously connected were provided with access to the campus backbone network. New premise wiring, optical fiber, and network components were implemented throughout the campus to establish universal backbone network connectivity. New faculty PCs were added and old PCs have been continuously upgraded.

At the same time, the network backbone has been upgraded from Ethernet to ATM operating at OC-12 (622 Mbit/second), with distributed 100 Mbit/second Ethernet switches. All primary network servers are directly connected to the ATM backbone, resulting in improved security and significantly enhanced performance. Multiple T-1 data links were installed between the main Orlando campus and our branch campuses and centers, linking these sites to the backbone network to support access to campus network services and the delivery of interactive video for distance learning.

The campus modem pool was modernized and expanded in 1997, and is further expanded each year to keep up with demand. Modem pools were added at the Brevard and Daytona branch campus sites to provide free local dialing for those service areas. There is no user fee for use of the UCF modem pool.

A system of Universal Access was implemented in 1995, whereby all UCF students, faculty, and staff are provided with network and e-mail accounts. User accounts remain active throughout an individual's association with UCF.

The University's new data center in the Computer Science Building houses Computer Services and campus network operations, providing a state-of-the-art environment. The building also includes computer laboratory space and a 450-seat multimedia auditorium.

UCF is adding major buildings at a rate of one or two a year, and all new buildings are being designed with full multimedia and data network resources. Through a companion

program, existing classrooms are being converted for multimedia instruction, network access, and computer-video display.

A major effort has been undertaken to expand and modernize campus public computer labs, and currently more than 1,200 lab PCs are available. Lab computers are on a three-year replacement cycle, and all labs are equipped with 100Mbps network connections, dedicated software servers, and high-speed laser printing. Trained consultants are available in all public labs. Labs and help desk support are available to UCF students and faculty 24 hours a day, including telephone, Web and walk-in assistance.

Administrative systems: A major project is underway to implement new administrative systems. PeopleSoft Student Administration and Human Resources systems will go into service during the coming 18 months, featuring an extensive Web interface to information and on-line transactions for students, faculty and staff. More UCF students now register over the Web than by any other means.

Faculty Development

Various units in the two Divisions mentioned above provide support for faculty: Course Development & Web Services, the Center for Distributed Learning, the Faculty Center for Teaching and Learning, the Office of Instructional Resources, the Library, and Computer Services.

UCF began an intensive faculty development program in the summer of 1996 to systematically teach faculty to create interactive learning environments for on-line delivery. Course Development & Web Services (CD&WS) provides specialized training for faculty learning to teach in the on-line environment through an award-winning course, IDL 6543: Interactive Distributed Learning for Technology-Mediated Course Delivery. IDL 6543 is an eight-week faculty development program designed to create interactive on-line environments to support mainstream faculty as well as early adopters and innovators. A course approach was designed to create collaboration and experiential learning. As the faculty development program matured, the delivery format modeled teaching with technology in the form of a simulated course. Since 1996, more than 200 faculty from all of UCF's five colleges have been involved in the IDL faculty development program.

As faculty attend IDL 6543, they build activities and Web pages for use in their courses. Participants are given a new computer or upgrade, release time or dual compensation, and course design and production support to develop and deliver their course. As more interest in the faculty development initiative arose, the Office of Academic Affairs established a request for proposal (RFP) process. Faculty are required to attend and participate in IDL 6543 and work with staff from the Course Development and Web Services unit to design and develop their on-line course materials. The unit has teams of full- and part-time instructional and digital media designers, programmers called Techrangers, and software engineers to assist with course production support.

Approximately 350 faculty have received support from CD&WS since the summer of 1996. In the fall of 1997, UCF adopted WebCT, an on-line course management tool. Today, there are over 800 WebCT accounts in use at UCF with over 30,000 registered users in those accounts.

In November 1998, UCF received an APQC-SHEEO (American Productivity and Quality Center--State Higher Education Executive Officers) faculty development award for using technology in teaching as one of five "best practice" institutions in North America.

The goals of one specific initiative within the IDL 6543 faculty development program related to undergraduate education are to:

- improve the quality of large-classroom instruction by enhancing interactivity with Web-based techniques.
- enhance the retention (or completion rates) in courses that traditionally have low student success by using
- Web-based techniques to increase student-student and student-instructor interaction, providing
- automated tutorials, and monitoring student progress using Web-based techniques.
- enhance classroom productivity by using a combination of Web-based and synchronous course delivery.
- For example, a course that normally meets three hours a week would meet only once a week, with the
- remainder of course content delivered over the Web.

The benefits of institutionalizing faculty development for on-line learning are:

- experiential learning for faculty participants
- cross-discipline sharing of teaching techniques
- creation of learning communities among faculty
- creation of lifelong learners among faculty
- discussion of the teaching and learning process
- peer evaluation of successes and failures
- faculty exposure to tools and instructional best practices
- modeling of a combination of delivery techniques
- cooperative and collaborative learning techniques
- greater flexibility for busy faculty
- transformation of all teaching for more active learning delivery.

The CD&WS instructional designers act as change agents to facilitate building a cultural change across disciplines for faculty with varying levels of technological ability and experience. Students are recruited each semester on campus to become Techranger programmers. These students are actively involved in supporting course development and production enabling faculty to focus more of their time on teaching and research.

Learner Support

Units throughout the University provide support for learners who are enrolled in on-line courses. An internal strategic planning grant was awarded in the summer of 1997 allowing staff from CD&WS and the Center for Distributed Learning to collaboratively develop The Pegasus Connections Disc. This CD-ROM provides learner readiness assessments, tutorials, just-in-time access to UCF information and services, software tools and plug-ins to connect to the campus network. Today, all UCF students and faculty receive a copy of The Pegasus Connections Disc during orientations.

Technical support is provided almost 24 hours a day by phone, e-mail, and at labs by CyberKnights, student computer consultants who assist UCF students with questions related to the use of the public access labs to complete their class assignments. Full- and part-time staff work in campus computer labs to provide face-to-face, telephone, and on-line support for students needing assistance with their courses. PALS On-line is an academic support program of peer tutors who assists students to successfully complete Web-based courses.

In addition, the UCF Center for Distributed Learning has responsibility for planning and administering the University's interactive television and Web-based programs. The Center serves as a clearinghouse for processes and resources in support of off-campus and distributed learning credit programs, courses, and students, as well as marketing for both live and distributed learning courses. It also provides leadership and coordination for efforts to achieve accreditation for distance learning programs throughout the University.

The Distributed Learning Advisory Committee (DLAC) was established to advise the Vice Provosts for Academic Affairs and Information Technologies and Resources, and the Director of the Center for Distributed Learning. The DLAC identifies academic program and support issues and makes recommendations in two main areas: (1) the development and implementation of quality distributed learning courses and programs, and (2) fulfillment of Southern Association of Colleges and Schools (SACS) accreditation requirements. The Committee meets monthly and consists of representatives of colleges, teaching faculty, branch campuses, and University administrators.

The Distant Student Support Committee meets every semester to discuss issues related to the needs of distant students, such as admissions, registration, orientation, health requirements, student accounts, library services, and bookstore. It consists of representatives from the offices providing the above services for students.

Support for Units

Resources are available to assist colleges to develop on-line programs and courses quite rapidly. Institutional support is focusing on degree and certificate programs and introductory high-enrollment courses, rather than individual courses, for Web-based

delivery. W and M on-line courses are supported at the institutional level. Undergraduate and graduate degree programs proposed by departments and approved by the colleges are supported through grants for faculty development and course redesign and development. Colleges respond to an RFP and propose courses, degree and certificate programs for on-line development based upon their own strategic plans for distributed learning. Grant awards provide a course release or dual compensation and other support for faculty to participate in the faculty development course for on-line teaching and receive instructional design and programming assistance.

Impact Evaluation

Since 1996 the University has collected data on the impact of its distributed learning efforts regarding student and faculty demographics, growth in enrollment and sections, student and faculty perceptions to learning and learning on-line, and problems encountered while teaching and learning in the on-line environment. Strong administrative support for evaluation has resulted in a coordinated approach to collecting data about student and faculty demographics, growth in enrollment and sections, student and faculty perceptions to learning and learning on-line, and problems encountered while teaching and learning in the on-line environment. These evaluation data have been used to target improvements in faculty development, learner support, and technical support needed by both faculty and students.

The guiding principles of the impact evaluation are:

- Evaluation should conform to the culture of the institution.
- Uncollected data cannot be analyzed.
- Data do not equal information.
- Qualitative and quantitative approaches must complement each other.

Student components that have been studied by the distributed learning impact evaluation staff include success rates, withdrawal rates, and learning styles. Issues affecting faculty that have been studied include critical thinking, data warehousing, effective instructional tools, quasi-experiments, and accreditation. Attitudes, demographics, and strategies for success have been examined for both students and faculty.

An examination of courses in Fall 1998 found that M courses outperformed their matched face-to-face counterparts. M sections produced a success rate (a grade of at least a C) of 86 percent (N=1,321 students), which was significantly higher than the success rate of 79 percent in the face-to-face sections (N=2,255 students).

Furthermore, these M sections had significantly fewer withdrawals (3 percent) when compared with face-to-face sections (6 percent).

Research and Development Agenda

The following are current and planned research and development activities that provide data and support for the University's distributed learning initiative.

Course Development & Web Services Development Activities

Software Engineering & Web Production

- E-Works work flow for production support
- Oracle WebDB for simple database management
- Educause's Instructional Management System
- E-commerce especially using PeopleSoft
- Web-based intelligent agents
- Integrating WebCT with Oracle and PeopleSoft
- Knowledge base development
- XML
- Video storage and serving
- Object-oriented media storage and management

Instructional Design

- Intelligent tutoring
- Intelligent computer assisted instruction
- Macromedia Authorware and Director applications
- Instructional game development
- Network-based games
- Network-based, Performance Support System Development
- Network-based simulations and animations
- Human factors for improved interface design
- Virtual team support
- Video conferencing
- Advanced video production

Administrative Support

- Business processes for production factoring in turn over and part-time staffing

Distributed Learning Impact Evaluation Research Activities

- Collecting and analyzing data on student participation, success rates, and withdrawal rates in fully on-line
- and media-enhanced (reduced seat time) courses
- Assessing the impact of learning styles in the on-line environment
- Assessing the satisfaction of students and faculty with the on-line environment

- Developing data sets to enable analysis of demographic trends for students and faculty participating in
- on-line courses
- Using evaluation results to develop strategies for success for faculty and students
- Supporting faculty research on teaching and assessing critical thinking on-line
- Developing real time approaches to data collection
- Assisting faculty with quasi-experiments looking at teaching effectiveness in on-line environments
- Assisting faculty to assess the impact of on-line teaching and learning on the accreditation process
- Assisting faculty to assess the impact of teaching large enrollment on-line classes
- Assessing faculty changes in personal theorizing
- Evaluating the effectiveness of various assessment devices in the on-line environment
- Documenting and assessing the process of re-engineering courses for full Web delivery and for
- media-enhanced (partial Web) delivery
- Assessing the impact of fully on-line and media-enhanced classes on student rating of instructor
- performance
- Developing profiles of those who withdraw from fully on-line and media-enhanced courses
- Assessing how on-line teaching fits into the University culture
- Developing strategies for predicting success in various on-line instructional environments

UCF Distributed Learning Related Websites

University of Central Florida	http://www.ucf.edu
UCF Distributed Learning	http://distrib.ucf.edu/
Center for Distributed Learning	http://distrib.ucf.edu/cdl
Course Development & Web Services	http://reach.ucf.edu/~coursdev/
IDL 6543 Faculty Development Workshop	http://reach.ucf.edu/~idl6543/
Distributed Learning Impact Evaluation	http://reach.ucf.edu/~research/
Office of Instructional Resources	http://www.oir.ucf.edu/
Academic Computing Support	http://www.ir.ucf.edu/
Faculty Center for Teaching and Learning	http://reach.ucf.edu/~fctl/